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INDIANA DEPARTMENT OF HIGHWAYS

JOINT HIGHWAY
RESEARCH PROJECT
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ENGINEERING SOILS MAP OF DAVIESS COUNTY, INDIANA

P. T. Yeh

purdue university

PURDUE UNIVERSITY

Final Report

ENGINEERING SOILS MAP OF DAVIESS COUNTY, INDIANA

To: H.L. Michael, Director
Joint Highway Research Project

August 23, 1984

Project: C-36-51B

From: P. T. Yeh, Research Engineer
Joint Highway Research Project

File: 1-5-2-74

The attached report, entitled "Engineering Soils Map of Daviess County, Indiana," completes a portion of the project concerned with development of a county engineering soils map of the State of Indiana. This is the 74th report of the series. The report was prepared by Dr. P. T. Yeh, Research Engineer, Joint Highway Research Project.

The soils mapping of Daviess County was done primarily by airphoto interpretation. Some test data along access roads are included in the report. Generalized soil profiles of the major soils from each landform are presented on the engineering soils map. An ozalid print of the engineering soils map of Daviess County is included in the report.

Respectively submitted,

P. T. Yeh

P. T. Yeh
Research Engineer

PTY/rrw

cc: A. G. Altschaeffl
J. M. Bell
W. F. Chen
W. L. Dolch
R. L. Eskew
J. D. Fricker
J. R. Skinner
W. H. Goetz
G. K. Hallock
J. F. McLaughlin
R. D. Miles
P. L. Owens
B. K. Partridge
G. T. Satterly
C. F. Scholer
R. M. Shanteau
K. C. Sinha
C. A. Venable
L. E. Wood
S. R. Yoder

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by

P. T. Yeh
Research Engineer

Joint Highway Research Project

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All 1937 airphotos used in connection with the preparation of this report were obtained from the United States Department of Agriculture.

ENGINEERING SOILS MAP OF DAVIESS COUNTY, INDIANA

Introduction

The engineering soils map of Daviess County, Indiana which accompanies this report was done primarily by airphoto interpretation. The aerial photographs, having an approximate scale of 1:20,000, were taken in September 1937 for the United States Department of Agriculture and were purchased from that agency.

Aerial photographic interpretation of the land forms and engineering soils of this county was accomplished in accordance with accepted principles of observation and inference (1)*. The boundaries of soils determined from the airphoto were then compared with the agricultural soil map (2) and a correlation of the soil series and the engineering soils map were established. The agricultural soils map and report serves not only as verifications of the airphoto interpretation but also provides information on soil characteristics and general soil profile.

The soil boundaries were reduced to the scale of the engineering soils map (1 inch = 1 mile) by projection. Standard symbols developed by the staff of the Airphoto Interpretation Laboratory of Purdue University's School of Civil Engineering were employed to delineate landforms, parent materials, and soil textures. The text of this report largely represents an effort to overcome the limitations imposed by adherance to a standard

* Number is parentheses indicate reference in the Bibliography

symbolism and map presentation.

Although no soil samples were collected and tested by the staff of the Joint Highway Research Project, general soil profiles were developed and are shown on the soils map. The soil profiles were compiled from the agriculture literature. Liberal reference was made to the "Formation Distribution and Engineering Characteristics of Soils" (3) and "Soil Survey of Daviess County, Indiana" (2). The boring data used was furnished by the Indiana Department of Highways, Division of Materials and Tests Soils Sections.

DESCRIPTION OF AREAS

General

Daviess County is located in the southwestern part of Indiana (Figure 1). The county is irregular in shape along its western and southern boundaries which follow the courses of the White River and the East Fork of White River respectively. The county is bounded on the north by Greene County, on the east by Martin County, on the west by Knox County, on the southwest by Pike County, and on the southeast by Dubois County (Figure 1). The airphoto mosaic of the county is shown in Figure 2.

The county is about 19 miles (30.6 km) wide and about 28 miles (45 km) long (north-south). It contains 433 square miles or 277,120 acres (1,120 square kilometers) (2). According to the 1978 Census of Agriculture, 86.6 percent of the county area is

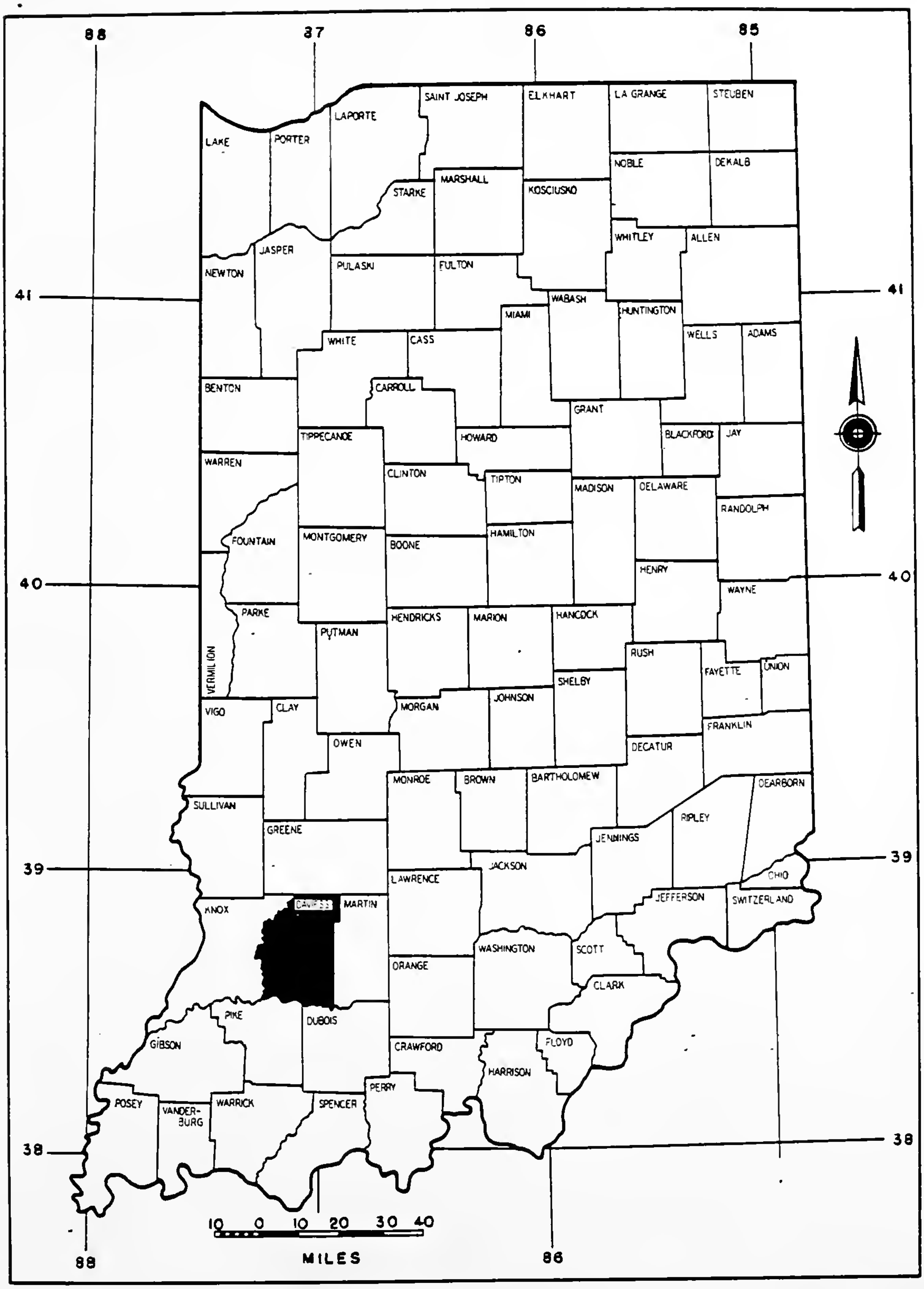

FIG. I. LOCATION MAP OF DAVIESS COUNTY

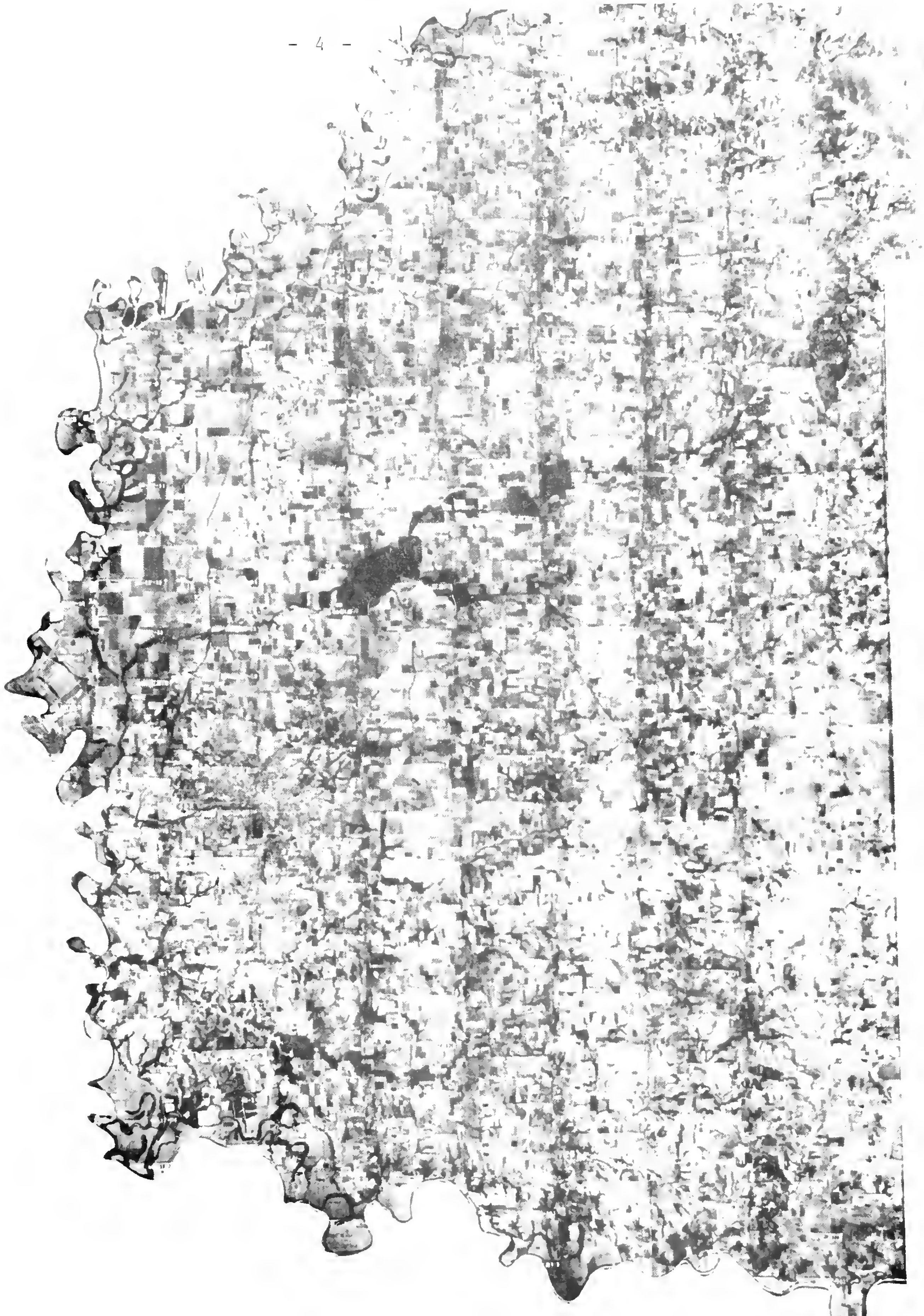

FIG. 2. AIRPHOTO MOSAIC OF DAVIESS COUNTY, INDIANA

farm land and only 20,319 acres or 7.4 percent of the county is wooded land (4). Daviess County had a population of 27,836 in 1980 with 11,325 residing in Washington, the county seat (5). The urban population decreased 0.63 percent during the 1970-1980 period.

Drainage Features

Daviess County lies wholly within the White River drainage basin. With the White River forming the western boundary of the county, most of the northern four-fifths of the county is drained directly into the river in westerly flowing streams (see Figure 3). The main streams from north to south are Smothers Creek, Prairie Creek, and Veales Creek. The southern one-fifth of Daviess County is drained by the East Fork White River and its southernly flowing tributaries. Sugar Creek drains the southeastern corner of Daviess County, Mud Creek the southcentral, and Aikman (Allmans) Creek taking care of the surface run-off for the area in the southcentral and the western part of the county.

The drainage patterns in Daviess County are quite different from one part to the other. The drainage pattern reflects the different topographies, the surface soils, and the underlying materials. A well developed, fine-textured dendritic drainage pattern is found on the uplands in the northeastern corner and the southern third of the county. A less dense dendritic pattern or an absence of a drainage pattern is exhibited in the eastern

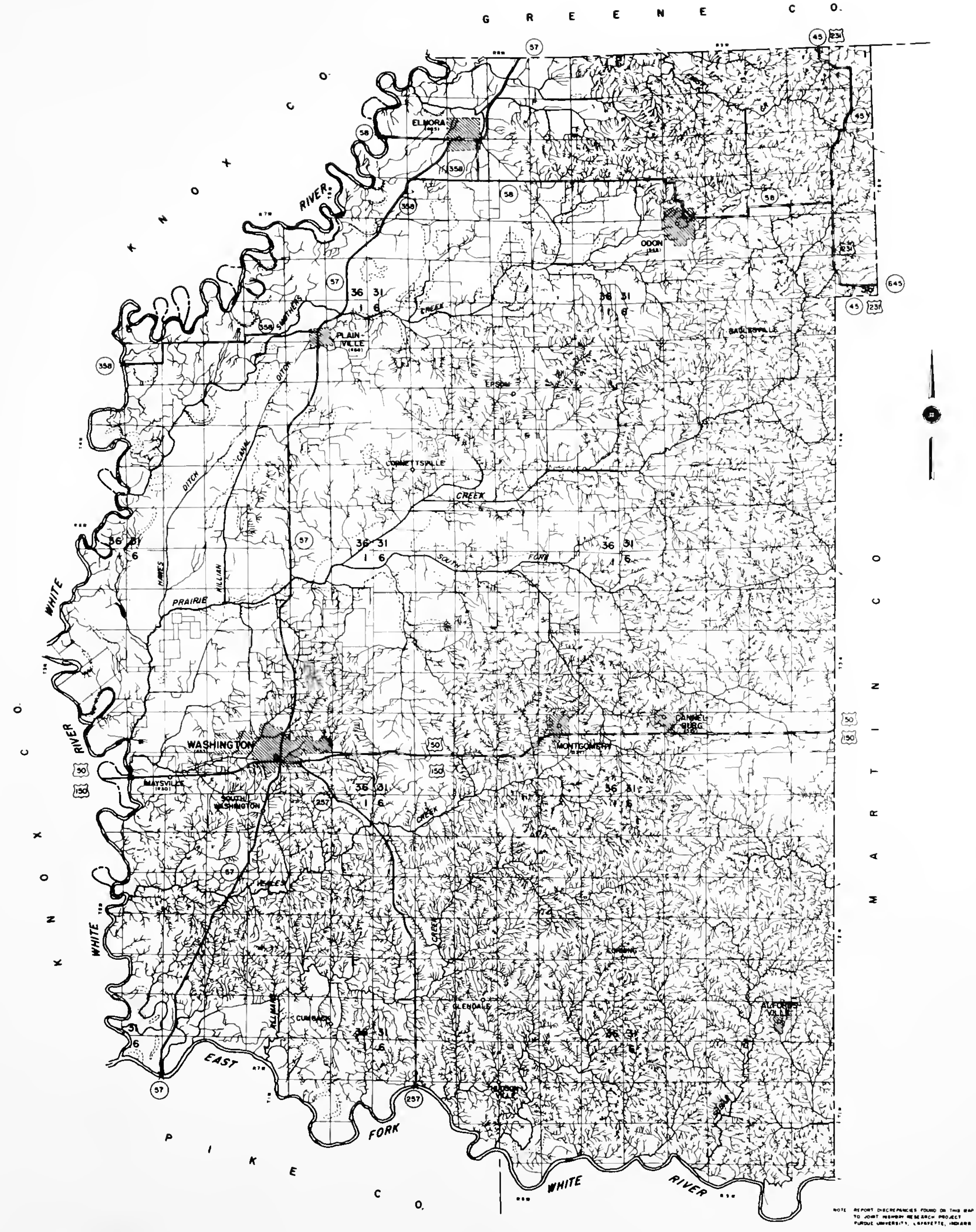

FIG. 3.

DRAINAGE MAP

DAVIESS COUNTY

INDIANA

and central regions. A local rectangular pattern occurs when the streams cut down to bedrock.

The White River valley was one of the major sluiceways for the melt waters of the Wisconsinan glacier (6). It was wide throughout the entire course but narrowed somewhat at the junction with the East Fork of White River. The river shows a meandering course on an anastomotic drainage pattern typical of a mature valley. In fact, the county boundary which follows the course of the river exhibits oxbows in a number of places (see Figures 2 and 3) due to the migration of the channel. The oxbows are indicated as depression on the drainage map and show a very dark tone on the aerial photo mosaic.

A large glacial lake formed during the Wisconsinan glacial period and occupied the Prairie Creek valley. The surface drainage development in this region is widely spaced because of the flatness and low topographic position. Extensive ditching is found on this lacustrine plain area. The main body of the lake bed became a depression as indicated on the drainage map. The darkest spots near the center of the county on the airphoto mosaic (Figure 2) are the tones associated with the main body of the lakebed which is now extensively wooded (Thousand Acre Woods).

No surface drainage pattern is found in the sandy plains and sand dune areas along the northwestern portion of Daviess County. All drainage in this area is internal as shown on the drainage

map by areas devoid of gullies.

Many rock exposures are found in the valley walls along the East Fork White River (7) and along the streams of the northern and eastern parts of the county. Deflections of streams and even complete reversals in direction of streams are observed on the drainage map (Figure 3).

Although a huge glacial lake was formed during the Wisconsinan glacial period no lakes exist in the lakebed areas. Small ponds of various origins and some artificial lakes are found in Daviess County. Many of them are the result of strip mining. The largest man-made lake is the Glendale Lake (Dogwood Lake) along Mud Creek in the south. The next largest is West Boggs Creek Lake boundering Martin County.

Climate

The climate of Daviess County is continential, humid, and temperate. Air of both tropical and polar origin bring frequent changes in temperature and humidity.

The average annual rainfall is 42.8 inches (107.5 cm.). Precipitation is generally greatest late in spring and early in summer. Thunderstorms are the primary source of rainfall in summer. Occasionally, there are periods up to three weeks long in summer and early in the fall during which there is little or no rainfall.

Relative humidity on a typical summer day ranges from 40 percent in the afternoon to 90 percent at night just before dawn. In the winter, the most probable range of relative humidity is from 60 percent to 90 percent. Southerly winds bring a higher humidity than northerly winds. Prevailing winds are from the southeast most of the year, but they are westerly and northwesterly in winter. At a height of 20 feet (6 meters) above ground, the average wind velocity is about 10 miles (16 kilometers) per hour in the spring and approximately 7 miles (11 kilometers) per hour late in summer. Winds are stronger during daylight hours than at night.

Table 1 shows the temperature and precipitation during the 1931-1960 period at Washington.

Physiography

Daviess County lies almost wholly within the Wabash Lowland physiographic region of the state (Figure 4). Only a very small portion of the southeastern corner of the county is in the Crawford Upland (8). The physiography of the western part of the county consists of broad terraces, lacustrine plains, and bottom lands on flood plains. The rest of the county, except for the steeply sloping areas along valley walls of river systems is nearly level to moderately sloping upland.

In respect to its physiographic situation in the United States, most of the county lies within the till plain section of

Table 1. Temperature and Precipitation Data at Washington, Daviess County
Means and extremes for period of record 1931-1960

Month	Temperature				Precipitation					
	Means		Extremes					Snow, Sleet		
	Daily Max. °F	Daily Min. °F	Record Highest °F	Record Lowest °F	Mean	Greatest Daily inches	Year	Mean	Greatest Daily inches	Year
January	42.1	25.8	76	-15	3.88	5.03	1937	2.7	6.0	1937
February	45.4	27.4	75	-14	2.72	2.99	1945	2.1	5.2	1960
March	54.2	34.0	84	- 4	3.94	3.49	1945	1.9	5.2	1949
April	66.7	44.9	89	22	4.15	2.90	1940	0.2	2.7	1953
May	76.1	54.3	98	32	4.23	2.80	1943	0	-	-
June	85.2	63.6	107	42	4.80	3.93	1947	0	-	-
July	88.9	66.8	110	49	3.68	3.03	1958	0	-	-
August	87.6	65.7	107	47	3.05	4.53	1951	0	-	-
September	81.7	58.2	104	32	3.31	4.62	1954	0	-	-
October	70.6	47.5	95	22	2.60	2.48	1937	T	T	1957
November	54.3	35.5	84	0	3.36	3.05	1950	0.8	6.7	1958
December	43.5	27.6	74	- 4	3.01	2.26	1933	2.5	4.0	1939
Year	66.4	45.9	110	-15	42.73	5.03	1937	10.2	6.7	1958

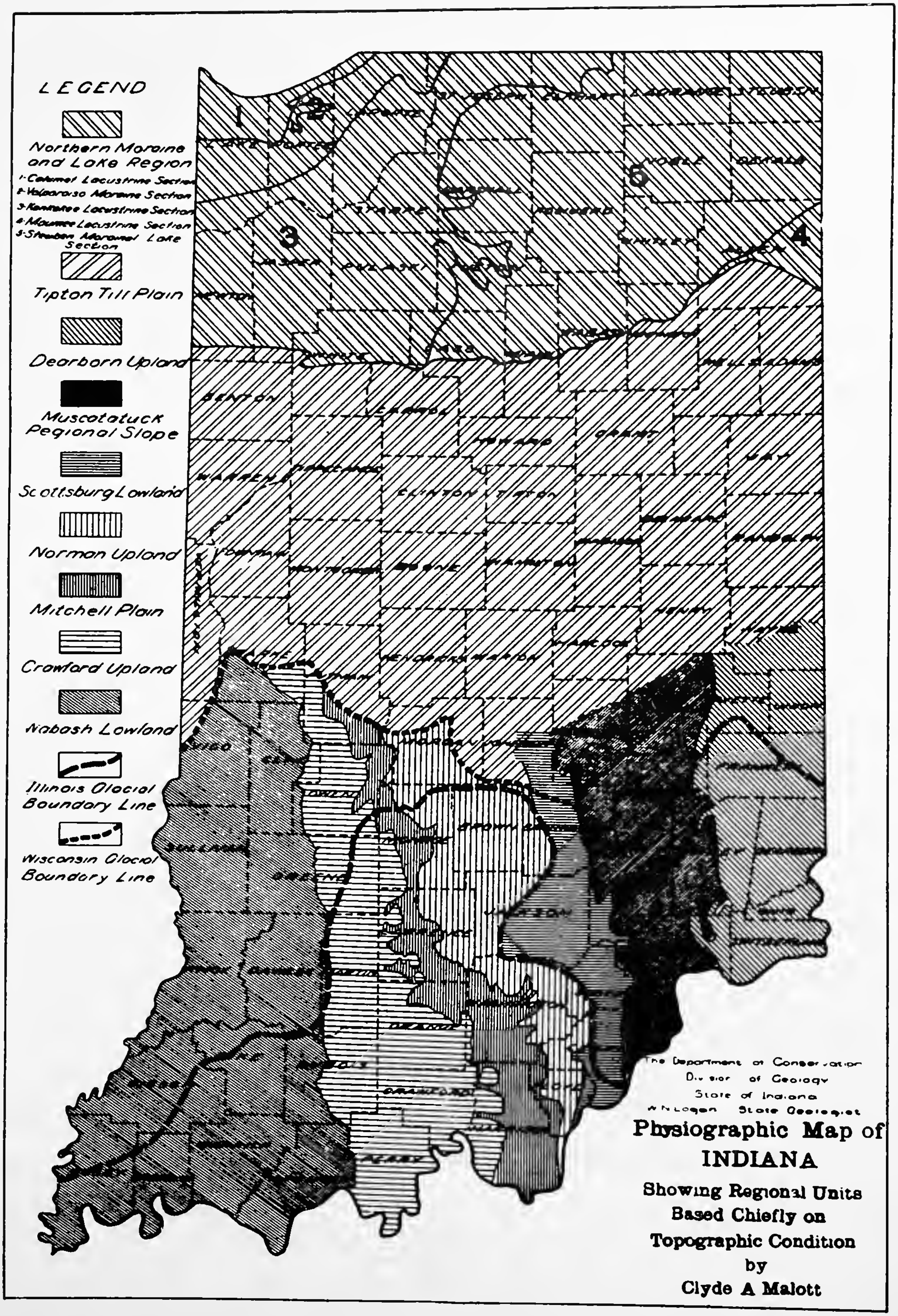
LEGEND
Northern Moraine and Lake Region
1-Calumet Lacustrine Section
2-Valparaiso Moraine Section
3-Kankakee Lacustrine Section
4-Maumee Lacustrine Section
5-Steuben Morainal Lake Section
Tipton Till Plain
Dearborn Upland
Muscatatuck Regional Slope
Scottsburg Lowland
Norman Upland
Mitchell Plain
Crawford Upland
Wabash Lowland
Illinois Glacial Boundary Line
Wisconsin Glacial Boundary Line
1
2
3
4
5
The Department of Conservation
Division of Geology
State of Indiana
W. N. Logan State Geologist
Physiographic Map of INDIANA
Showing Regional Units Based Chiefly on Topographic Condition
by
Clyde A Malott

FIG. 4

the central Lowland Province as the county lies north of the Illinoian glacial boundary. A small portion in the southeast corner of the county is included in the Interior Low Plateau Province (8).

Topography

The surface of Daviess County varies greatly from nearly level on the flood plains and terraces in the west to a highly dissected, hilly upland in the northeastern section (Figure 5).

The low wide flat flood plains are associated with White River and East Fork White River valleys along the western and southern border of Daviess County. An area of low flat terrace or sandy plain is found adjacent to the White River along the upper two thirds of the river. Extensive areas of sand dunes also formed along the eastern part of both the White River and the East Fork White River valleys (Figure 6). A large, low lacustrine region occurs east of the sand dunes. The eastern half and the southern third of the county are glacial uplands. It is a slightly rolling surface with a few high hills such as the Serfert Hill northeast of Washington and those near Montgomery. Dissected and hilly areas are found near the streams and rivers. The most highly dissected topography of Daviess County occurs in the northeastern corner and the southeastern corner of the county. In these regions, local relief of 100 feet (30 m) or more occurs.

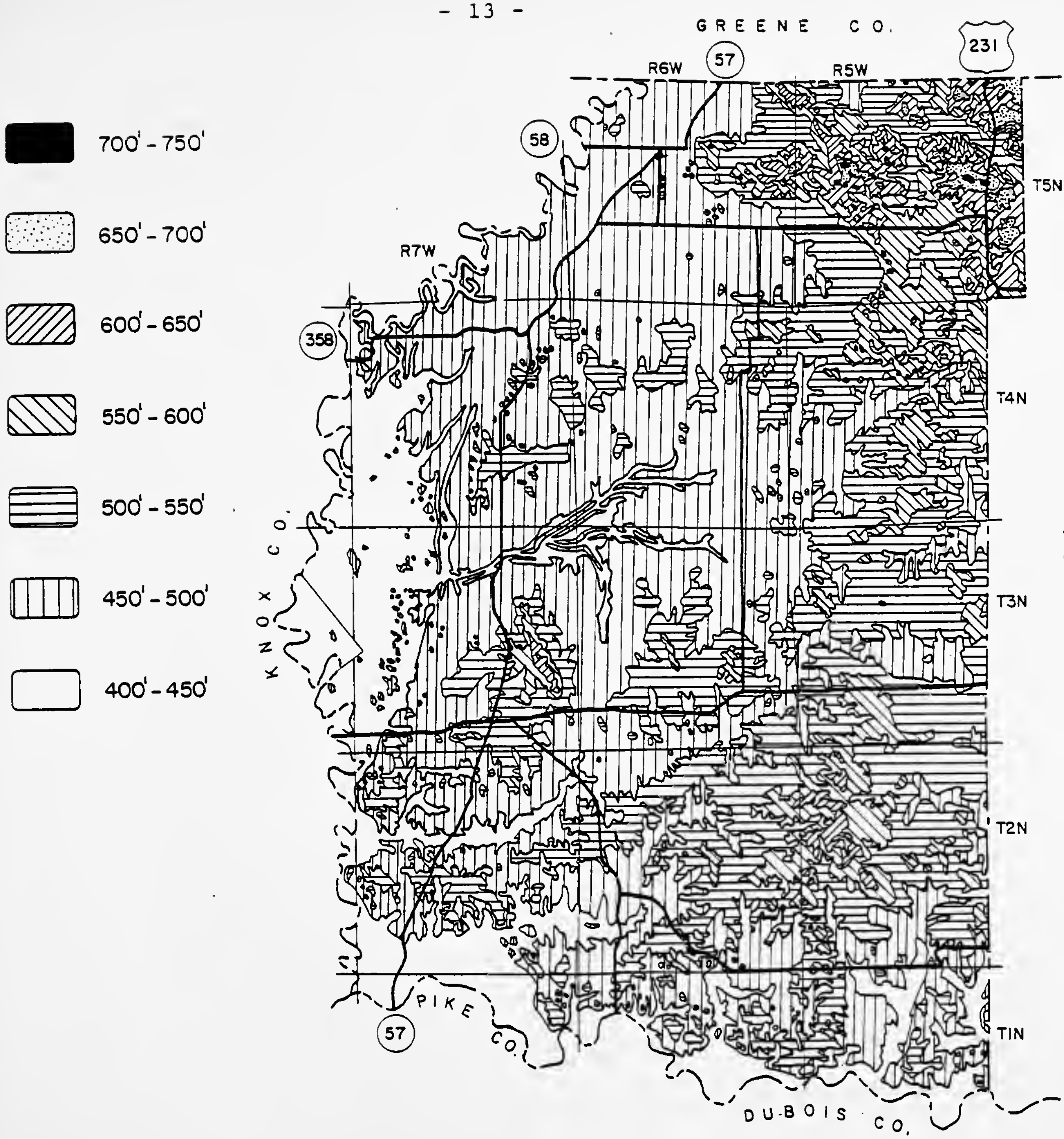

FIG. 5. TOPOGRAPHIC MAP OF DAVIESS COUNTY.

Daviess County has an average elevation of 540 feet (162 m) above sea level (8). The maximum local relief is about 175 feet (52.7 m) located along Sugar Creek in Sec. 17, TIN, R5W. The highest point of the county is above 720 feet (217 m) located near the border with Martin County at the northeastern corner in Sec. 12, T5N, R5W. The lowest point of Daviess county occurs at the southwestern corner where the East Fork White River joins the White River at Sandy Hook. The elevations is 410 feet (123.5 m) above sea level.

Geology

The surface and near surface geologic materials represented in Daviess County are the unconsolidated material of the quaternary period and the consolidated material of Palezoic age.

The distribution of the unconsolidated deposits of the county are shown in Figure 6 (9). The area along the White River and East Fork White River are classified as clastic sediments of silt, sand and gravel deposits of the Martinsville formation (10). A series of low terraces located east of White River in the northern half of the county is classified as gravel, sand, and silt of valley train deposits and outwash facies of the Atherton Formation. An area of eolian sand dune deposits of sand and some silt of the Atherton Formation is formed on the upland east of the White River valley and in the southern part of the county along East Fork White River. A large lacustrine deposit of clay, silt and sand of the Atherton Formation occupies the

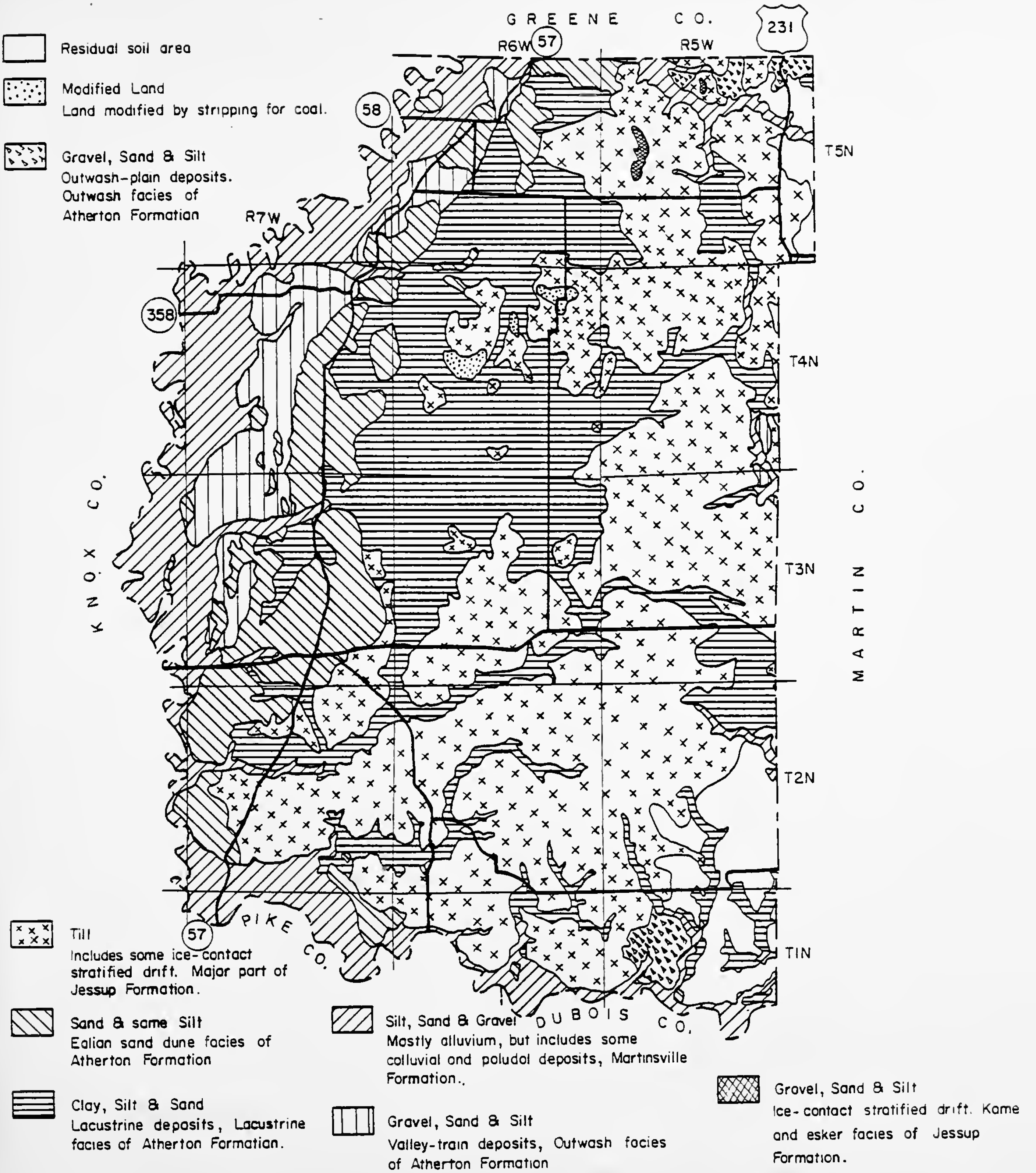

FIG. 6. UNCONSOLIDATED DEPOSITS IN DAVIESS COUNTY.

north central portions of Daviess County. The eastern and the southern third of the county is covered by Illinoian till classified as the Jessup Formation (10). The only residual soil areas are found in a limited area in the northeastern corner and along the southeastern border of the county (Figure 6).

The bedrock underneath the residual soil and the unconsolidated surface materials are sedimentary rocks of Pennsylvanian age (8). The western and southwestern part of the county is underlain by the Carbondale Group and the remainder of the county is underlain by the Raccoon Creek Group as shown on Figure 7. The Carbondale Group consist of primarily shale and sandstone with some limestone and clay between the top of the Seelyville Coal Member (III) and the top of the Danville Coal Member (VII) as shown in Figure 8. The Raccoon Creek Group consist of the Mansfield, Brazil and Staunton Formations which are 95 percent shale and sandstone with 5 percent limestone, clay, and coal which are lenticular and discontinuous (15). Outcrops of the Mansfield sandstone are found along the streams of the northern and eastern parts of the county (11). One heavy ledge of sandstone outcrops along the East Fork of White River but most of the layers are thin and soft (7). Limestone is found at Hudsonville and in the north central part of Sec. 8, TIN, R6W along East Fork White River (11).

The drift is very thin on the eastern side of the county as the border with the driftless area occurs and extends into Martin County. One or two miles (1.6 to 3.2 km) from the drift boundary

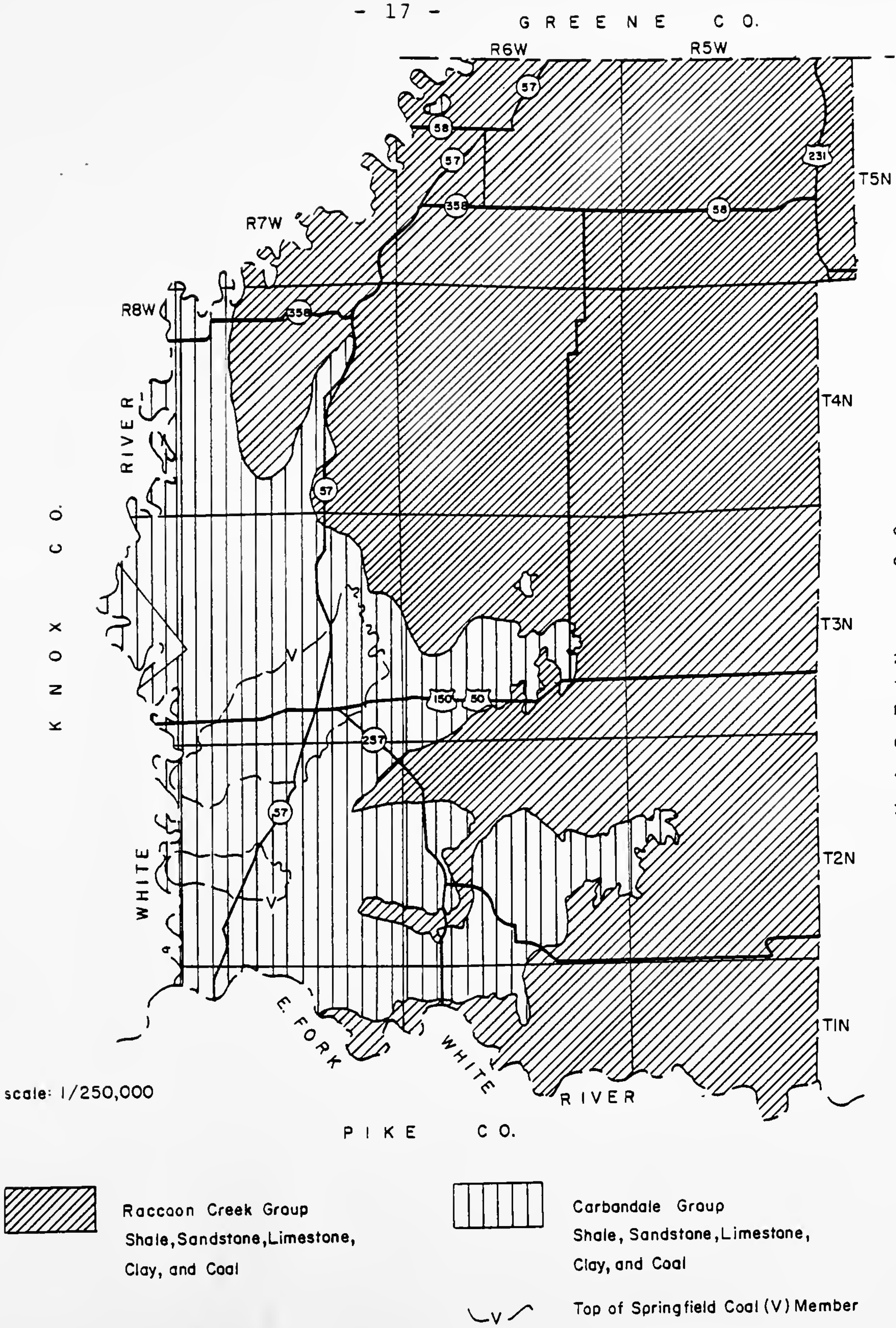

FIG. 7. BEDROCK GEOLOGY OF DAVIESS CO.

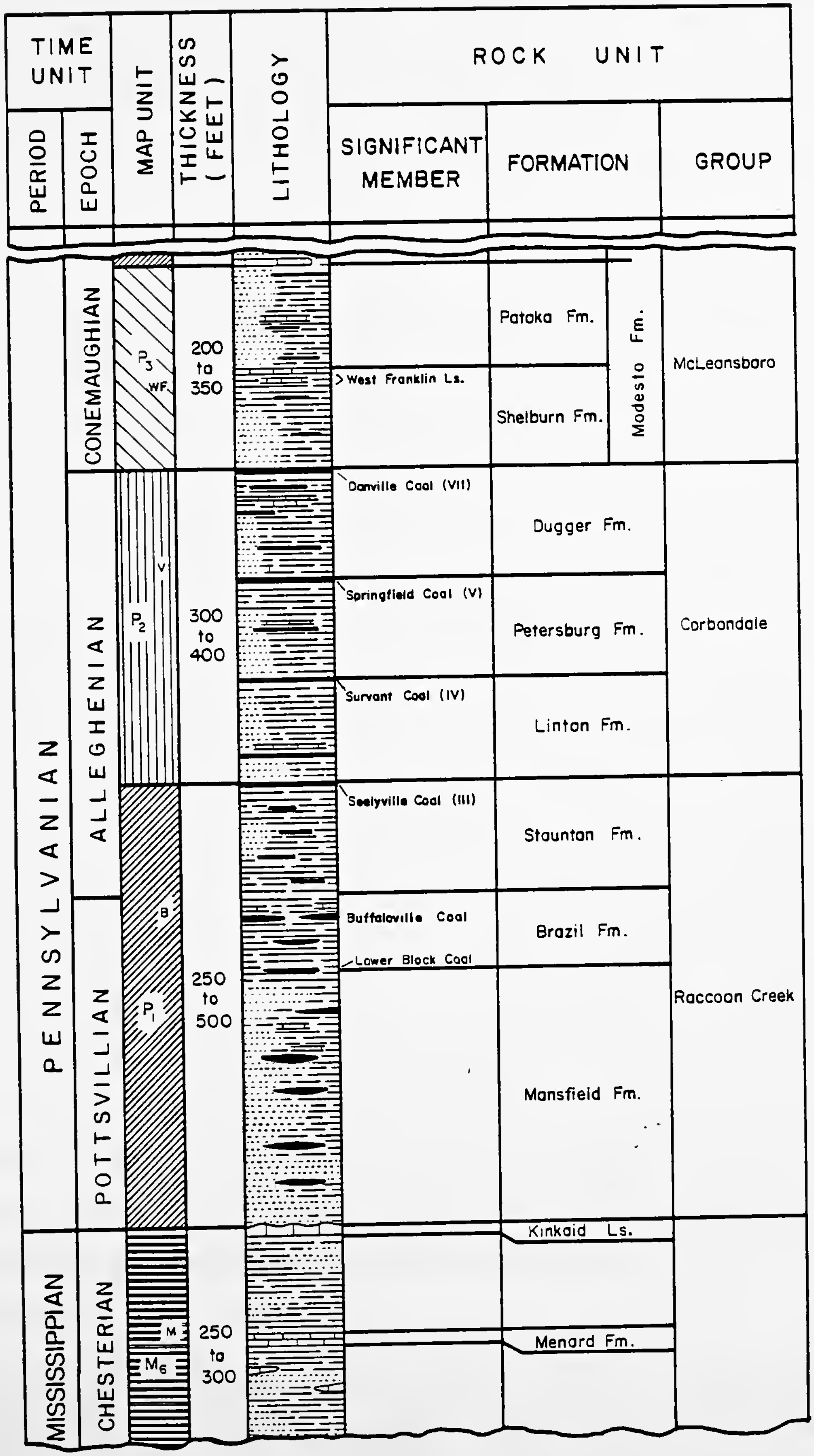

FIG. 8. COLUMNAR SECTION SHOWING BEDROCK UNITS IN DAVIESS COUNTY.

in the southeastern corner only scattered pebbles remain (12). The low hills along the eastern border of Daviess County which are several miles inside the drift border show only a thin coating of drift (12). The drift is thicker toward the west. It ranges from 20 to 80 feet (6 to 24 m) or more in the central and western parts of the county and the glacial-fluvial deposits fill the lowlands to considerable depth (12).

Land Form and Engineering Soil Areas

The engineering soils in Daviess County are derived both from unconsolidated material and to a very limited extent, from the weathering of residual bedrocks (See Figure 6). The residual soils occur in the upland in the northeastern and southeastern corners of the county as well as along some valley walls. The unconsolidated materials include fluvial, eolian, lacustrine and glacial deposits. The fluvial deposits are confined to the White River valley and the East Fork White River valley and their tributaries. The lacustrine deposits occur in the former glacial lake site in the northcentral portion of the county. The glacial deposits occupy the southeastern half and part of the northeastern quarter of Daviess County. The eolian deposits cover almost the entire surface of the county. The thicker and coarser of the eolian deposits, however, occur along the eastern side of the White River valley.

The deposits of transported materials are not homogeneous and variation are to be expected. The profile and general

properties of the soils for each area of different landforms are presented on the map that accompany this report.

Eolian Deposited Materials

There are extensive eolian (wind) deposits in Daviess County. Except for the alluvial plains, the entire county is covered by windblown silt or loess deposits of varying depth. The thick loess deposits occur along the eastern valley wall of the White River and decrease both in textural size and in depth toward the east (See Figure 9). An area of sand dune deposits is found along the White River on the east valley wall. The eolian deposits of the county are subdivided into sandy eolian drift and silty eolian drift material.

1. Sandy Eolian Drift

The sandy textured eolian drift of Daviess County is located along the eastern side of the White River valley and to a lesser extent along East Fork White River. Due to the difference of landform the sandy deposit is further subdivided into four groups i.e. (a) sand dune, (b) incipient sand dune, (c) highly organic topsoil depression in the incipient sand dune, and (d) windblown sand on terrace.

a. Sand Dune

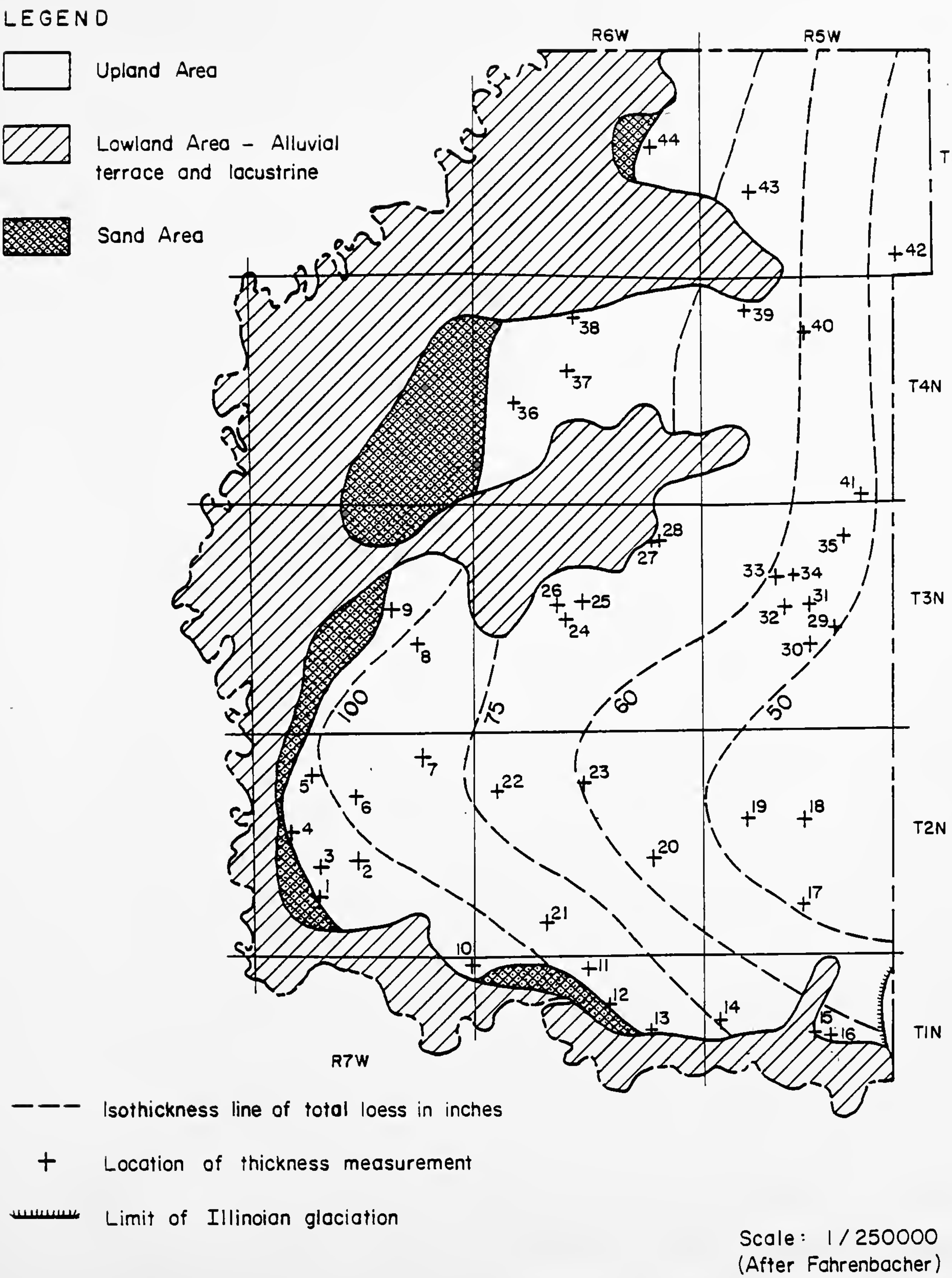

FIG. 9. ISOPACHOUS MAP OF LOESS DEPOSIT IN DAVIESS COUNTY.

Extensive areas of sand dune deposits occur in the southwestern quarter of Daviess County near the White River as well as along the East Fork White River channels. The other massive dune deposits are located along SR 57 between Washington and Plainville, east of Elmore and along the border with Greene County. Numerous small sand dune or low ridges of different size and shape are scattered on the western part of the county.

The massive sand dunes are relatively high above the adjacent plains. In places the differences in elevation is over 100 feet (33 m), especially east of the White River valley in the southwestern quarter of the county. The individual dunes are not as high as most of them are about 10 feet (3 m) higher than the adjacent land surface.

Surface drainage systems are absent in the hummocky sand dune areas. However, interdunal basins and infiltration basins are observed in the inter-dune areas. A few short, steep gullies are sparsely developed along the edge of the dunes where the difference in elevation above the adjacent lands is great.

The materials of the sand dune areas are predominantly fine uniform windblown sands. However, small amounts of silt and clay particles are mixed with the

fine sands at the surface. Lateral and vertical change of soil composition is quite noticeable. The surface soils are usually fine sandy loam classified as A-4 by the AASHO classification. A slightly more amount of clay accumulates in the subsurface layer but the classification remains the same. The subsoil is a sandy loam (A-4 classification). The parent material is fine sand classified as A-3. Along the sloping areas, the top soil is a loamy fine sand (A-2) underlain by fine sand (A-3). Engineering problems in this soil region are generally associated with cuts and fills and unstable nature of the sandy material. It is subjected to both wind and water erosion. Good vegetative protection is vital to maintain surfaces.

b. Incipient Sand Dune

The northwestern third of Daviess County has a large area of rather flat upland plain with low sand ridge formations scattered on the surface. This is a windblown sand deposit without distinct dune forms. It is classified as incipient sand dune deposit or a windblown sandy plain. The surface ranges from slightly undulating to nearly flat with many slightly lower infiltration basins and swales. Surface drainage systems are absent in this areas as internal drainage is high. However, the dark tone subsurface form of phan-

tom drainage pathway are observed in places on the aerial photographs.

The soil of this area is formed in wind-deposited sand and coarse silt. The surface layer is a fine sandy loam (A-4) soil. The B-horizon is a light sandy clay loam (A-6) and the parent material is stratified sandy loam to fine sand (A-2) soil. The substratum is likely to be a lacustrine deposit.

The problem associated with this deposit is the seasonal high water table and the poor supporting power of the subsoil.

c. Highly Organic Topsoil Depression in Incipient Sand Dunes

Many large depressions occur in the incipient sand dune region. The area is much darker in tone on the airphotos and is extremely flat in topographic form. No surface drainage exists except for man-made ditches to lower the water table. Occasionally small white tone mounds or ridges appear within the depression that represent eolian deposition.

The soil profile in the depression is essentially the same as those of the incipient sand dune deposit except that the top soil and the subsurface soil are thicker and the moisture content is higher. Also, the

organic content is higher in the topsoil and the stratified fine sand in the C-horizon contains minor layers of silt loam and loam.

The problem with this area is the high water table. The topography favors ponding. Frost heave occurs during the winter.

d. Windblown Sand on Terrace

Between the White River flood plain to the west and the sand dunes on the east, lies an area of rather flat plain that contains scattered sand dunes on its surface. This is the valley train or terrace of the White River valley. The plain has an elevation of 460 feet (140 m) above sea level at the northern end near Plainville and it slopes gradually to the south to an elevation of 445 feet (135.5 m) above sea level southwest of Washington. A drop of 15 feet (4.6 m) of elevation in more than 10 miles (16 km). This terrace is only a few feet higher than the narrow strip of flood plain and low terrace to the west. The sand dunes scattered on its surface are well-formed but rather low in magnitude (most are about 5 feet, 1.5 m). Some large shallow depressions are also found in this area. The surface of this sandy terrace is void of any surface drainage. Some current scars are observed near Plainville. Only the darker tone due to moisture

delineates the original terrace features of current scars.

The soil in this area is formed in wind-deposited sand underlain by terrace deposits. The top layer is a fine sandy loam (A-4) soil. The B-horizon contains some clay and is classified as a sandy clay loam (A-6). The parent material to a depth of 60 inches (1.8 m) is stratified fine sandy loam and fine sand classified as A-2 soil. Sand and gravel is found in the substratum.

The soil of the large shallow depressions along the foot of the sand dunes in interdunal areas are essentially the same as those mentioned previously.

The problem of this area is wetness due to a high ground water table especially visible in the depression. The area is subject to overflow in periods of flooding. Occasional ponding occurs in the depressions during the wet season.

2. Loess Deposits

Extensive wind-blown silt or loess deposits are found in Daviess County. The loess covers nearly all the landforms in the county with the thickest deposit of over 100 inches (3 m) occurring near the valley of the White River. The loess gradually decreases in depth to less than 45

inches (137 cm) near the eastern border of the county (see Figure 9 and Appendix A). The loess deposits are subdivided into groups and shown on the map according to the relative depth of the loess and the type of underlying materials. The subdivisions are (a) loess plain, (b) loess on Illinoian ground moraine, (c) loess on lacustrine plain, (d) loess on outwash plain, and (e) loess on sandstone-shale plateau.

a. <u>Loess Plain</u>

The loess plains are found adjacent to the wind-blown sand dune and the incipient sand dune areas along the White River and along the north bank of East Fork White River. The largest area is located in the vicinity of Washington. Another area is mapped near the junction of the East Fork White River and White River.

The loess plain is a mantle of 6 to 10 ft. (2 to 3.3 m) of silt over either lacustrine plain or sandstone-shale bedrock. Although the surface is smooth, the topography is influenced greatly by the topography of the underlying materials. More rolling or hilly topography is found near Washington and near the junction of the White River and the East Fork White River where the underlying material is sandstone-shale. Loess deposits superimposed on the lakebed area east of Plainville are more subdued and smooth.

The typical pinnate or feather like drainage feature for deep loess deposits is absent in this moderately thick loess deposit. The surface drainage is dendritic and is well developed in the loess and changes to rectangular by the erosion of the underlying bedrock material particularly in the southwestern quarter of Daviess County. Surface drainage systems are poorly developed in the loess deposit on the lakebed region east of Plainville. Only the dark tone of the subsurface drainage and some short gully developed occurs along the edges.

The soil profile of this loess plain deposit is developed purely in windblown silt. The surface soil varies from silt loam to silty clay loam soil (A-4 to A-6). The B-horizon contains more clay and ranges from a silty clay loam to clay soil (A-6 to A-7-6). The parent material of the soil is a silt loam or silty clay loam soil (A-4 to A-6). The depth of the profile varies according to its topographic position. A thinner profile is found near the gullies where erosion removes part of the topsoil. The problems in this deposit are erosion of the soil, frost heave, and change in strength with change in moisture.

b. <u>Loess on Illinoian Ground Moraine</u>

The major portion of the upland area of Daviess County is classified as loess on Illinoian ground moraine. This region exhibits an undulating surface. As a whole the surface is slopping slightly from the northeast toward the southwest. The thickness of the Illinoian drift in the county varies from almost nothing near the border with Martin County to more than 80 ft. (24 m) toward the west. The topography therefore is influence greatly by the underlying bedrock especially in the eastern part of the county. The typical Illinoian ground moraine with white-fringed gullies is not always present in this region because of the loess cover. The loess is thicker on the west and is thinner toward the east. It varies from 4 to 8 ft. (1.3 to 2.6 m). The loess is thin (from 20 to 40 inches or 50 to 100 cm) on slopes near streams and gullies because of sheet and rill erosion.

The soil profile is developed mainly by the weathering of the loess. The A-horizon is a silt loam or silty clay loam (A-4 to A-6) soil. The subsurface soil contains more clay and is classified as silty clay loam or silty clay (A-7) soil. The C-horizon varies from the loess parent material, if the deposit is thick, to the underlying low plastic Illinoian clay (A-4 to A-6). Test borings along the access road to the Glendale Fish and Wildlife area (14) lies partly in this area. Test

site No. 6 shows that from the surface to a depth of 6 ft. (2 m) the soil is entirely a silty clay loam (A-7-6). The topsoil may have been eroded in this area. The engineering problems includes frequent cuts and fills, seepage, and erosion on slopes, and frost heave.

c. Loess on Lacustrine Plain

The areas of loess on lacustrine plain are located in the northern half of Daviess County. It is the transitional zone between the lacustrine plains and the uplands. The surface is very smooth to slightly undulating. The surface drainage is not well developed. In places ditches are used to facilitate the draining of the surface water. The break between this area and the loess on Illinoian ground moraine is determined very easily both by the abrupt change of elevation and the change in topography of the surface. This loess cover in this area is about six feet (2 m). The soil profile is developed mostly in the loess. The topsoil is a silt loam or silty clay loam (A-4) soil on the high topographic position. The topsoil contains more organic material with silt loam or clay (A-4 to A-6) in the low positions. The B-horizon contains more clay and is classified as silty clay loam or clay (A-6 to A-7). The parent material is a silt loam or silty clay loam (A-4 or A-6) soil. The stratified silt loam or

silty clay loam or occasional clay layer is found further down in the lacustrine deposit. The major problem in this area is the seasonal high water table. The area is subject to frost heave and ponding.

d. Loess on Outwash Plain

The loess on outwash plains are confined to the extremely northern part of Daviess County. The largest plain is located east of Elnora and northwest of Odon. The plain is more than 100 ft. (35 m) higher than the incipient sand dune deposit to the west and the loess covered lacustrine plain to the south. It is slightly lower than the loess covered Illinoian ground moraine to the east. This loess covered outwash plain is dissected severely by erosion of the loess cover. Steep gullies are found along the northwestern edges of the deposit due to its great difference in elevation. The other two areas located near the border line with Greene County have a smoother surface and are less dissected because the difference in elevations with its surrounding areas is much less (about 30 ft. or 10 m).

The underlying outwash deposit is verified by the test boring of the loess deposit by Fahrenbacher (13) at sites Nos. 43 and 44 (See Figure 9 and Appendix A). The red sandy loam Illinoian outwash material is over-

lain by 70 and 85 inches (1.7 and 2.2 m) of loess at Site Nos. 43 and 44 respectively.

The soil profile of this area is developed mainly by the weathering of the windblown loess. The A-horizon is generally a silt loam but may contain a little more clay in the low areas and becomes a silty clay loam (A-4 to A-6). The B-horizon is usually more clayey and is classified as A-6 or A-7 soil. The parent material is a stratified sand with thin layers of gravel at depth of 12 to 15 ft. (3.6 to 4.5 m) below the surface. The problems in this area include frequent cuts and fills, the erodible character of loess on side slope, and the possibility of frost heave.

e. <u>Loess on Sandstone Shale Plateau</u>

The loess covered sandstone-shale areas are confined to the eastern quarter of Daviess County. The topography is rugged because of the erosion of the bedrock. The thickness of the loess is about 36 to 48 inches (1 to 1.3 m) in the interstream areas on ridge tops. It decreases rapidly on slopes at natural drainageways. At test site No. 42 (Figure 9 and Appendix A) the loess is 45 inches (115 cm) thick on sandstone shale residum as reported by Fahrenbacher (13).

The soil is developed partly by the loess and partly by the weathering of sandstone and shale. The surface soil is a silt loam or silty clay loam (A-4 to A-6). The B-horizon is a silty clay loam to silty clay (A-6 to A-7) soil and the parent material is a silt loam or silty clay loam (A-4 to A-6). Sandstone fragments are found further down in the silt loam and silty clay loam soil before the interbedded sandstone and shale is reached at a depth from 48 to 72 inches (1.2 to 1.8 m). However, a thinner A- and B-horizon may be present because of erosion to bedrock in some areas.

The problems of this area are the need for frequent cuts and fills, the erosion on side slopes, frost heave, and the presence of rock at fairly shallow depth.

Glacial Deposited Materials

Essentially the majority of the soils of Daviess County underlying the loess are of glacial origin. The drift material is of the Illinoian Age but the Wisconsinan Age glaciation produced flood plains, terraces and lacustrine plains. Because of the thick loess cover of the county many of the deposit are discussed under the eolian deposited materials. This section is concerned with the soil mainly developed from the glacial materials. The glacial deposit is subdivided into (a) Illinoian Ground Moraine, (b) Outwash

Plain, and (c) Eskers and Kames.

a. Illinoian Ground Moraine

The Illinoian ground moraine is associated with the loess on Illinoian ground moraine. They are located along the natural drainage areas or the side slopes of the upland. Most of the deposits are found along Veales Creek and Arkman Creek on the southwestern quarter of the county. The Illinoian ground moraine is covered by a thin layer of loess (less than 20 inches or 50 cm). The ground slope is steep (varied from 25 to 50%).

The soil is formed in material that weathered from till that originally was covered by a thin mantle of loess. The surface soil is silt loam or silty clay loam (A-4 or A-7-6) soil and the parent material is the loam or clay loam (A-6 or A-7) Illinoian drift. The problem in this area is mainly frequent cuts and fills.

b. Outwash Plain

A few outwash plains are recognized in Daviess County. The largest one is located just north of Odon. The others are scattered in the northeastern corner of

the county and south of Washington.

The surface of these outwash plain deposits are far from a smooth plain because erosion occurs. Gullies are developed along the edges.

The loess cover varies from less than 18 inches to about 30 inches (45 to 75 cm). The surface soil varies from a loam to or silty clay loam (A-4). The B-horizon ranges from a clay loam to clay (A-6). The parent material varies from a sandy clay loam to clay (A-2 to A-6). The substratum is mostly stratified sand with thin layers of gravel at depths of 8 to 15 ft. (2.5 to 4.5 m) from the surface.

The problems in this region are associated with the erodible side slopes as well as frost heave.

c. <u>Eskers and Kames</u>

A few ridges and hills are recognized as possible eskers or kames on the airphotos of Daviess County. They are scattered and confined to the north eastern quarter of the county. The most noticeable esker that is more than a mile (1.6 km) long is located just over a mile (1.6 km) north of Odon. It is high above its surrounding area with a magnitude from 10 to more than 30 ft. (3 to 10 m). The others are different in shape.

A large, wide ridge is located about one mile (1.6 km) north of Connelburg. It is more than two miles (3.2 km) in length from north to south and about one quarter of a mile (0.4 km) in width. The surface elevation varies from 540 ft. (165 m) above sea level at both ends to 600 ft (178 m) at it highest point near the center. Some hills, with irregular shapes and rather large in size, are difficult to determine whether they are kames or the remnant of a dissected outwash plain. The topographic form is usually used to delineate the land forms. Since the materials are essentially the same between the esker or kame form and the outwash materials, they are considered as kame or esker in this report.

Because the Illinoian drift deposit is subjected to a long period of erosion and weathering the sharp ridge of the esker or kame deposits are much reduced in its topographic appearance in Daviess County. The deposit is also covered by about 30 inches (75 cm) or more of loess. The surface soil is a silt loam to silty clay loam (A-4) soils. The subsurface soil is a little more clayey with either a silty clay loam or clay (A-6). The parent material is a sandy clay loam (A-6). The substradum material is mostly stratified sand and gravel and is encountered 12 to 15 ft. (3.6 to 4.6 m) below the surface.

The engineering problems in the kames or eskers are associated with cuts through the topographic highs and possibility of frost action.

Residual Soils

The residual soils in Daviess County are found in the eastern quarter and the southern quarter of the county. The largest area lies on the northeastern corner of the county. Other areas occur along the valley walls of the entranched streams. An isolated strip is located on Sefert Hill northeast of Washington. The surface slope varies from 6 to 75 percent. Many gullies are developed in this region and the topography is extremely rugged. Most of the area is covered with timber because it is not suitable for farming. This residual soil area is situated at the highest elevation of Daviess County. The surface elevation is over 700 ft. (210 m) above sea level.

The residual soils of Daviess County are developed from a very thin cover of loess on the interbedded sandstone and shale plateau. The loess in this area is less than 36 inches (1 m). In the steep slope areas it is much less and, in some cases, is absent entirely because of erosion.

The soil profile varies greatly depending on its topographic position, erosional situation, and the rock types. On a level area the topsoil is a silt loam (A-4). The sub-

surface soil contains a little more clay and is classified as silt loam or silty clay loam (A-4 or A-6). Further down in the profile rock fragments are found in the more coarse textured silt loam to sandy loam weathered residual soil. The interbedded sandstone, siltstone, and shale generally is encountered at a depth from 20 to 42 inches (50 cm to 1.2 m) from the surface.

The engineering problem associated with this region are associated with frequent cuts and fills. Different types and characteristics of residual soils or bedrock are encountered within a short distances both horizontally and vertically.

Fluvial Deposited Materials

About one-third of Daviess County is covered by fluvial deposited materials. Four different landforms created by the action of water namely: (a) lacustrine plain, (b) terrace, (c) flood plain, and (d) marsh or swamp depression are discussed.

1. Lacustrine Plain

About half of the fluvial deposited materials in Daviess County are classified as lacustrine plain or slack water plain. These lacustrine plains were formed along White River and its tributaries during the

Wisconsinan glaciation period (6). Large lacustrine plains are found along North Fork and South Fork of Prairie Creek and the head water area of Smothers Creek. Considerable portion of the original lacustrine plains are covered by a thick layer of loess as discussed previously. The thin loess (less than 50 inches or 1.25 m in thickness) covered area of the lacustrine plain is discussed in this section.

The lacustrine plain exhibits a very level surface. Gullies are widely spaced and usually occur along the edge of the plain. It shows a medium uniform gray tone on the airphotos. The lacustrine plains have a darker tonality, a more level surface, and ditches are presents to facilitate surface drainage.

The elevations of the lacustrine plains are different one from the other. The highest one is located at the northeast corner of Daviess County with an elevation of 620 ft. (190 m) above sea level. Other lacustrine plains reach 540 ft. (165 m) at the head water region to 450 ft. (137 m) at the outlet.

Since the lacustrine deposits are covered by a thin layer of loess, the soil is developed partly from the thin loess cover and partly from the sheet wash materials from the uplands. The surface layer of the soil is a silt loam or silty clay loam (A-4 to A-6).

The B-horizon varies from silty clay loam to clay (A-6). The parent materials consist of stratified silty clay loam, silty clay, silt loam, and clay (A-4 or A-6).

Test borings along the access road for Glendale Fish and Wildlife area (14) illustrate the texture of the lacustrine deposit. Boring Nos. 1, 2, 3, 4, 5, and 8 are taken in the lacustrine plain. In areas where borings Nos. 1, 2, 3, and 4 were taken, the profile shows 3 ft. (1 m) of silt (A-4) followed immediately by 4 ft. (1.3 m) of silty clay loam (A-6-15) and a clay loam (A-6-12) further down.

Boring No. 5 is located near the edge of the loess covered Illinoian drift upland. The profile is somewhat different. It exhibits 5.5 ft. (1.7 m) of silt (A-4) followed by more plastic silty clay loam (A-7-6). Boring No. 8 is located at the lower point in another lacustrine plain. The profile consists of 3 ft. (1 m) of silt (A-4) followed by 1.8 ft. (54 cm) of silty clay loam (A-7-6) and is underlain by more than 2.7 ft. (80 cm) of sandy loam (A-2-4). Test borings in the higher level ground both north and south show a more normal profile. It consist of 1.5 to 3.5 ft. (40 cm to 1 m) of silt (A-4) followed by 2.5 ft. (76 cm) of silty clay loam (A-6) and more plastic silty clay loam (A-7-6) further down.

In the depressions or low areas of the lacustrine plain, the surface layer is more clayey and contains more organic matter. It is classified as silty clay loam or clay with high organic content (A-7). The subsurface layer is a silty clay or clay (A-7) but without organic matter. A clayey soil (A-7) is further down in the profile. The stratified lacustrine deposits usually is silty clay or clay with thin silty clay loam or clay loam layers.

Two large depressions are observed on the airphoto mosaic (Figure 2). The large dark area near the middle of the county is the Thousand Acre Woods along Prairie Creek. The area is a swamp forest and marsh grass land. The other depression area is located along Smother Creek and is less swampy because it is cleared for farm land and drained by ditches. An organic symbol on the map is added on the lacustrine plain to differentiate the difference of this region from the normal condition.

The engineering problems associated with the lacustrine or slackwater plain are the high water table, low carrying capacity, and the settlement of heavy structures. In the depressions, ponding occurs seasonally. High shrink-swell potential also exsist in this fine-texture soil.

2. Terrace

Two types of terraces are recognized in Daviess County. The one along White River is a low terrace and the other, along the tributary of First Creek and West Boggs Creek Lake, are high terrace. They are quite different and are discussed separately.

a. Low Terrace Along White River

The low terrace starts from Elnora and follows the White River southwardly and ends south of Washington. The boundary is quite irregular and the width also varies greatly from place to place. The terrace is only slightly higher than the adjacent White River flood plain but a few feet (more than 1 m) below the windblown sand on terrace deposit previously discussed.

The surface of this low terrace is rather level except at the upstream headward portions where many current scars occur on the surface especially at the section near Elnora. The surface becomes smoother toward the south. The other current scar markings are found west of Plainville. The coarseness of the deposit is confirmed by the extensive gravel pits. The texture of the

deposit varies greatly from place to place and consists of wash-in or slackwater material over the terrace deposits. Fine sandy loam or loam is found on high areas and a silt loam or clay in the low areas. (A-4 to A-7). The B-horizon also varies from sandy clay loam to clay (A-4, A-6, to A-7), The C-horizon ranges from a sandy loam to clay (A-4 to A-7). Stratified sand or sandy loam with fine gravel is found in some places. Stratified silty clay loam or clay loam with occasional layers of sandy clay loam is observed in other areas.

The major problem in this area is the seasonal high water table. The surface is submerged for long periods in spring and fall floods.

b. High Terraces

The high terrace deposits occur in the northeastern quarter of Daviess County along First Creek and, also, along part of the West Boggs Creek Lake near Martin County.

The high terrace along the tributary of First Creek could be part of an outwash plain deposit in that region. However, the landform fits the valley train formation and is mapped as terrace

deposit in this report. The surface of this section is rather level at an elevation of 550 ft. (167 m) above sea level. It is about 40 ft. (14 m) higher than the stream surface and about 100 ft. (33 m) below the adjacent sandstone-shale upland to the east.

Terraces along West Boggs Creek Lake area are about 40 ft. (12 m) higher than the lacustrine plain surface. The surface of the terrace is gently undulating.

Little or no-surface drainage develops in the high terrace. However, short steep gullies are found widely spaced along the terrace face.

The deposit essentially is the same material as the outwash plain. The soil profile as well as the engineering problem are similar to the outwash plain deposit as mentioned previously.

3. Flood Plains

About half of the flood plains in Daviess County belong to the major river systems. The extent of mapping of these plains is determined by the scale of the engineering soils map. Due to the different source of the alluvial materials and the form of their deposi-

tion, the flood plains in this county are subdivided into the White River flood plains and the alluvial plain of the upland.

a. <u>White River Flood Plains</u>

The White River flood plain is a nearly flat surface except where broken by a series of low current scars and the abandoned meander channels. Surface drainage is channeled along the sloughs or scars created by the current of the flood water. The altitude of the flood plain varies from 478 ft. (145 m) above sea level at the north to 420 ft. (128 m) to the south. The width of the plain also varies from place to place.

The soil texture varies according to the topographic and geographic position. Coarse textured deposits are found in the natural levee near the channel. A finer textured deposit usually occurs in the slough and backwater swamp near the upland.

The soil profile in the high position exhibits a silt loam to silty clay loam (A-4) surface soil. The subsurface soil is about the same textures. At the low topographic position, the surface soil varies from a silty clay loam to a clay

(A-6 to A-7) with more organic matter in the depression. The subsoil is about the same except it contains little or no organic matter. The stratified deposits further down in this flood plain deposit are interbedded silt loam, silty clay loam, clay with lenses of sandy loam, and sandy clay loam.

The major engineering problem is associated with flood or high water, the danger of scour and the weak supporting power of the unconsolidated deposits.

b. Flood Plains in the Uplands

All the alluvial plains except these along White River are classified as alluvial plain. The deposits of the alluvial plain are derived from the erosion of the surrounding loess covered sandstone and shale upland, the loess covered Illinoian drift area, loess covered lacustrine plain, as well as loess covered outwash plains. Since most of the area of Daviess County is covered by a blanket of loess, the material in the flood plain of the upland region is essentially derived from the erosion of loess.

The flood plain surface usually is level and slopes toward the outlet. In the wide flood plain sections, however, meandering channels and current scars are observed on the aerial photographs but with a much reduced magnitude than those along the White River section. In fact, many of the wide flood plains were lacustrine plains originally but covered subsequently by the alluvial deposits. The meandering channels are straightened and dredged to facilitate drainage. Since the soil of the region is derived from the uplands, coarser textured material is expected adjacent to the upland and finer textured material further downstream.

The soil profile varies from a silt loam to a silty clay loam (A-4 to A-6) topsoil with a similar subsurface soil which is underlain by stratified silt loam, silt clay loam, and fine sand. Test Site No. 7 reported by the Indiana Department of Highways, Division of Materials and Tests Soil Section (14) showed the silt profile consists of 5.5 ft. (1.67 m) of silt (A-4) followed by 3 ft. (9 cm) of sand loam (A-4) soil and underlain by 14 ft. (4.2 m) of silty clay loam (A-6). Since the site is located in the alluvial plain and is at the edge of the loess covered Illinoian drift

upland, the bottom layer of the profile may be part of the Illinoian drift.

The problems associated with the area are the high water table, seasonal flooding, and weak supporting power of the soil.

4. Marsh or Swamp Depressions

Along the White River and East Fork White River valleys a number of marsh or swamp depression are recognized. These narrow and curved depression are the abandoned meanders and oxbows of the former river channels. The dark tone on the airphoto helps to delineate this deposit. The area is covered by swamp forest or swamp grasses. In some places even some water surfaces or ponds occur.

The soil profile consists of a surface soil of silty clay or clay (A-7 or A-6) with considerable amount of organic matter. The subsurface layer is the same in texture except without organic materials. Stratified silty clay, silty clay loam, and clay with occasionally sandy loam or loam lenses are found further down in the profile. The major problems in this area are wetness and weak supporting power.

Miscellaneous

Strip Mines

Intensive coal mining operations are observed on more recent aerial photography. Mining activity is not extensive on the 1937 aerial photography. However, some small old mines south of Washington are visible on the 1937 photos. Large mining areas are near Epsom and in the southeastern quarter of the county especially visible on recent aerial photographs.

The special saw tooth pattern of strip mine spoil banks is identified easily on the aerial photographs. Many of the newer or reclaimed mines are rather difficult to detect on recent airphotos after the surface is leveled. In the mining areas many elongated ponds are formed between the spoil banks.

The strip mines on the map are updated from the photos (taken in 1970) used by the "Soil Survey of Daviess County Indiana" (2). Many new mine areas are developed or old mine areas expanded since the 1970 photography, therefore, field examination is required. The areas marked on the engineering soil map are considered accurate up to 1970 only.

Gravel Pits

Only two abandoned gravel pits are observed on the airphotos. One is located on the low terrace of White River.

The other is on the flood plain of White River nearby. Even though there are many outwash plains, esker, and kame deposits in the county, no gravel pits are operated on them.

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APPENDIX A

Loess Thickness Measurements in Daviess County by J. B. Fehrenbacher

Site No.	Location Description Township	Range	Section	Total Depth in inches	Underlying Material
1	2N	7W	29,SW 1/4,NE 1/4	100	Gritty sil I-till
2	2N	7W	21,NE,SE 1/4	100	Gritty hv. sil I-till
3	2N	7W	20,NE 1/4,SE 1/4	105	Gritty red sil I-till
4	2N	7W	18,NE 1/4,SE 1/4	120	Gritty I-till
5	2N	7W	5,SE 1/4,SE 1/4	83	I-till
6	2N	7W	9,NE 1/4,SE 1/4	66	I-till
7	2N	7W	2,SE 1/4,NE 1/4	56	I-till
8	3N	7W	23,SE 1/4,SW 1/4	80	Sh I-drift soil
9	3N	7W	15,SE 1/4,SE 1/4	100	Gritty soil I-till
10	1N	7W	1,NW corner	105	Red ss
11	1N	6W	3,SW,NW 1/4	80	Gritty hv. sil I-till
12	1N	6W	10,SW,NW 1/4	90	Gritty hv. sil I-till
13	1N	6W	14,NW 1/4,NE 1/4	80	Gritty hv. sil I-till
14	1N	5W	7,SW 1/4,SW 1/4	70	Gritty si cl I-till
15	1N	5W	16,NW 1/4,SE 1/4	60	Sh soil
16	1N	5W	15,SE 1/4,NE 1/4	50	SS soil
17	2N	5W	28,SE 1/4	40	I-till
18	2N	5W	16,SE 1/4,NE 1/4	38	I-till
19	2N	5W	17,NW 1/4,NW 1/4	40	I-till
20	2N	6W	23,NE 1/4	50	I-till
21	2N	6W	32,NW,NE 1/4	70	Gritty sil I-till
22	2N	6W	7,SE 1/4,SW 1/4	70	Gritty sil I-till
23	2N	6W	23,NE 1/4	50	I-till
24	3N	6W	16,SE 1/4,SW 1/4	72	
25	3N	6W	16,SE 1/4	70	
26	3N	6W	16,SW 1/4	65	
27	3N	6W	2,SW 1/4,SE 1/4	78	Leached till
28	3N	6W	2,SE 1/4,SE 1/4	66	I-outwash
29	3N	5W	22,SW,NE 1/4	48	
30	3N	5W	21,SE 1/4	54	
31	3N	5W	16,SE 1/4	48	

32	3N	5W	16,SW 1/4	60	
33	3N	5W	8,SE 1/4	72	ss and sh
34	3N	5W	9,SE 1/4	72	probably till
35	3N	5W	3,SE 1/4	48	
36	4N	6W	20,NW,SW 1/4	100	Gritty si cl I-till
37	4N	6W	16,SE,SE 1/4	80	Gritty hv. sil I-till
38	4N	6W	4,SW 1/4,SE 1/4	75	Gritty cl lacustrine
39	4N	5W	5,SW corner	65	Gritty li si cl I-till
40	4N	5W	9,NE 1/4	72	
41	4N	5W	35,SW corner	58	
42	5N	5W	36,SW 1/4,NW 1/4	45	ss & sh residuum
43	5N	5W	20,SW 1/4,SE 1/4	70	Red sl I-outwash
44	5N	6W	14,SE 1/4	85	Red sl I-outwash

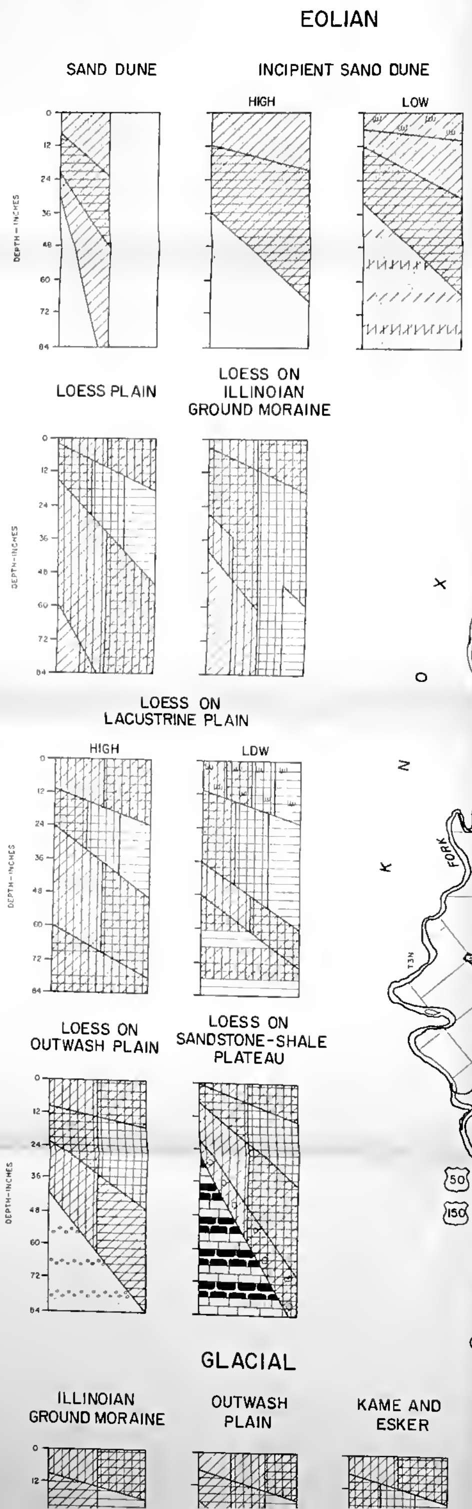
APPENDIX B

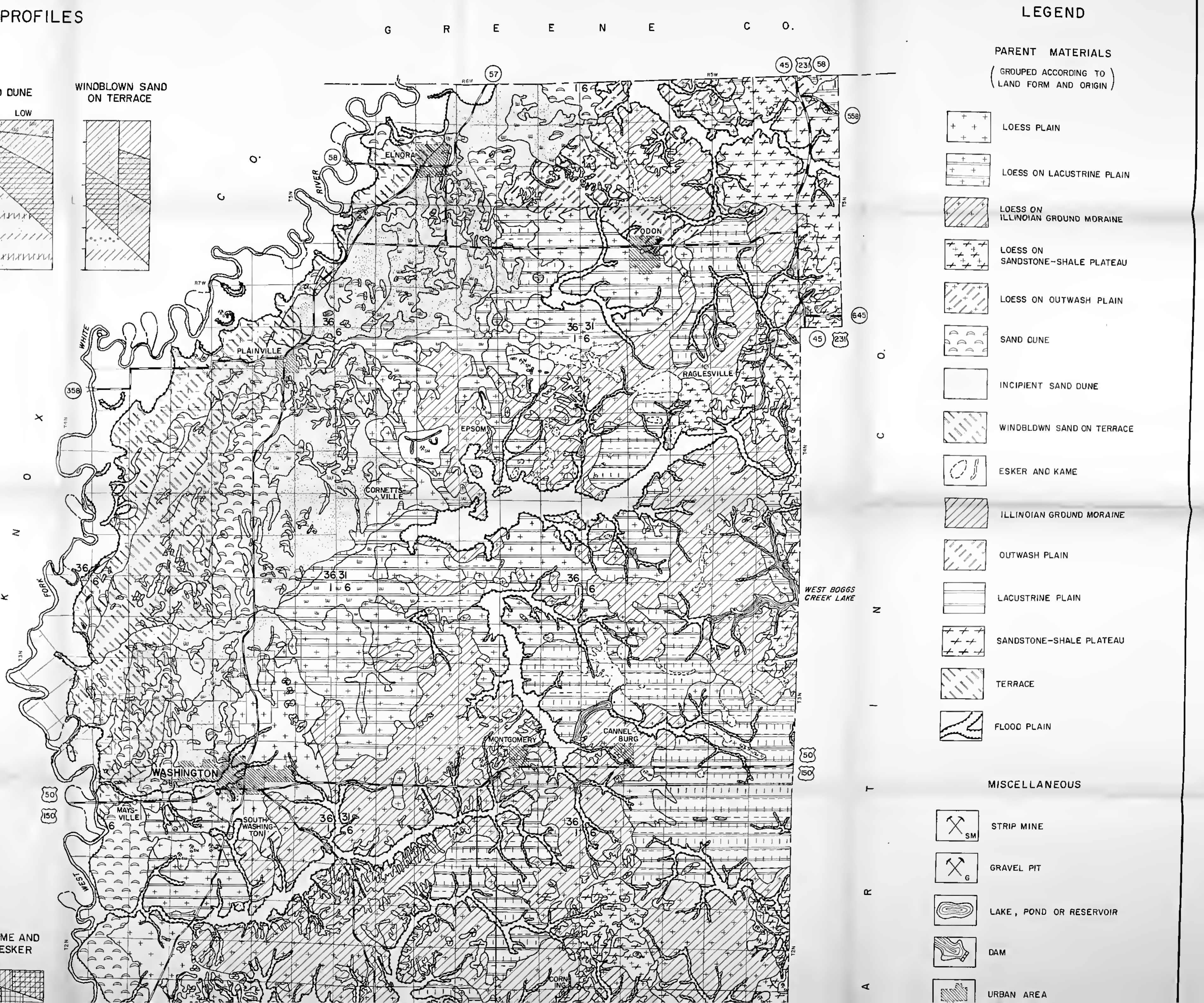
ENGINEERING SOIL TEST RESULTS

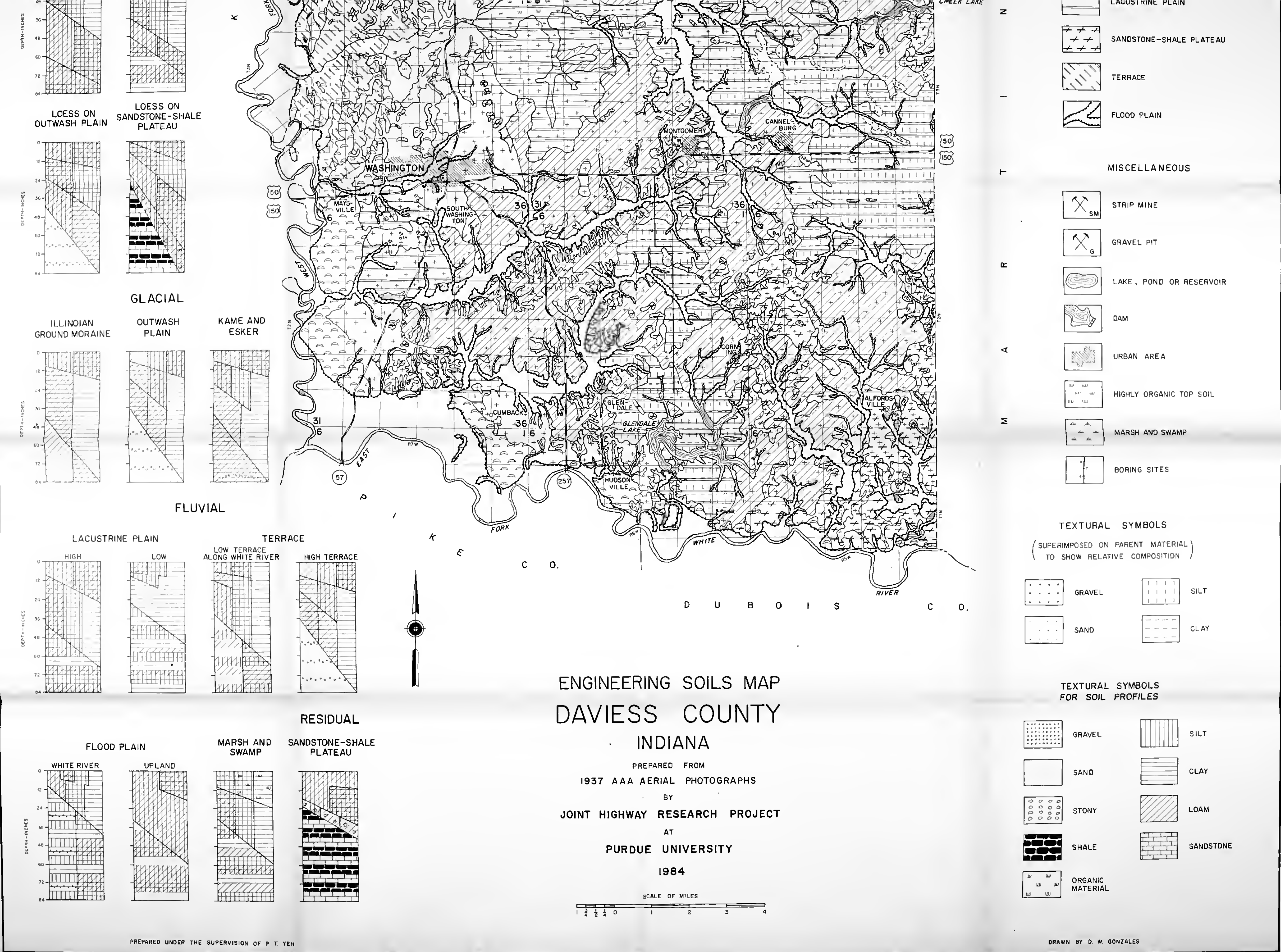
Site	Station	Offset (ft.)	Depth (ft.)	AASHTO Classification	Texture	Percent Gravel	Percent Sand	Percent Silt	Percent Clay	L.L.	P.L.	P.I.
1	23+27	25RT	1.0- 2.5	A-4(8)	Silt	0.0	3.6	82.1	14.3	30.1	22.2	7.9
2	32+00	15RT	11.0-12.5	A-6(12)	Silty Clay Loam	1.2	16.4	62.3	20.1	34.1	18.1	16.0
3	32+00	26RT	3.0- 7.0	A-6(15)	Silty Clay Loam	0.9	11.2	65.5	22.4	35.9	17.8	18.1
4	40+00	27RT	1.0- 2.5	A-4(5)	Silt	0.3	7.2	80.5	12.0	27.8	21.6	6.2
5	65+00	11LT	11.0-12.5	A-7-6(23)	Silty Clay Loam	0.3	7.7	65.0	27.0	42.9	18.7	24.2
6	133+03	15RT	4.5- 6.0	A-7-6(23)	Silty Clay Loam	3.4	6.1	62.5	28.0	45.0	20.8	24.2
7a	163+02	15RT	6.0- 7.5	A-4(0)	Sandy Loam	2.9	54.0	32.1	11.0	20.7	16.7	4.0
7b	163+02	15RT	11.0-12.5	A-6(17)	Silty Clay Loam	0.2	1.8	75.3	22.7	35.8	19.4	16.4
8	284+48	33LT	6.0- 7.5	A-2-4(0)	Sandy Loam	0.0	78.0	15.7	6.3	N.P.	N.P.	N.P.

The soil test data tabulated above was obtained from consultant's reports prepared for the Indiana State Highway Commission. The location of the site is shown on the attached engineering soils map. Considerable additional data is contained in the consultants report.

GENERAL SOIL PROFILES






LOESS ON OUTWASH PLAIN
LOESS ON SANDSTONE-SHALE PLATEAU
GLACIAL
ILLINOIAN GROUND MORAINE
OUTWASH PLAIN
KAME AND ESKER
FLUVIAL
LACUSTRINE PLAIN
HIGH
LOW
TERRACE
LOW TERRACE ALONG WHITE RIVER
HIGH TERRACE
RESIDUAL
FLOOD PLAIN
WHITE RIVER
UPLAND
MARSH AND SWAMP
SANDSTONE-SHALE PLATEAU
DEPTH-INCHES
WASHINGTON
MONTGOMERY
CANNELBURG
MAYSVILLE
SOUTH WASHINGTON
CUMBACK
GLENDALE
GLENDALE LAKE
HUDSONVILLE
CORNING
ALFORDSVILLE
WEST FORK
EAST FORK
WHITE RIVER
K N O X
P I K E C O.
D U B O I S C O.
M A R T I N
LACUSTRINE PLAIN
SANDSTONE-SHALE PLATEAU
TERRACE
FLOOD PLAIN
MISCELLANEOUS
STRIP MINE
GRAVEL PIT
LAKE, POND OR RESERVOIR
DAM
URBAN AREA
HIGHLY ORGANIC TOP SOIL
MARSH AND SWAMP
BORING SITES
TEXTURAL SYMBOLS
(SUPERIMPOSED ON PARENT MATERIAL TO SHOW RELATIVE COMPOSITION)
GRAVEL
SILT
SAND
CLAY
TEXTURAL SYMBOLS FOR SOIL PROFILES
GRAVEL
SILT
SAND
CLAY
STONY
LOAM
SHALE
SANDSTONE
ORGANIC MATERIAL
ENGINEERING SOILS MAP
DAVIESS COUNTY
INDIANA
PREPARED FROM
1937 AAA AERIAL PHOTOGRAPHS
BY
JOINT HIGHWAY RESEARCH PROJECT
AT
PURDUE UNIVERSITY
1984
SCALE OF MILES
PREPARED UNDER THE SUPERVISION OF P. T. YEH
DRAWN BY D. W. GONZALES
(14) DAVIESS COUNTY

COVER DESIGN BY ALDO GIORGINI